

CLAIMS

What is claimed is:

1. A radio-frequency identification (RFID) device comprising:
a chip; and
first and second antennas operatively coupled to the chip;
wherein the antennas are configured to receive signals of different frequencies.
2. The device of claim 1, wherein the antennas are configured to receive signals of different frequencies.
3. The device of claim 1,
wherein the first antenna is configured to receive relatively-high-frequency signals from an RFID reader; and
wherein the second antenna is configured to receive relatively-low-frequency jamming signals.
4. The device of claim 3, wherein the chip and the antennas are configured such that when the low-frequency jamming signals are received, communication between the RFID device and the RFID reader is prevented.
5. The device of claim 4, wherein the antennas are coupled to the chip in parallel.
6. The device of claim 4, wherein the second antenna is configured to receive low-frequency magnetic signals.
7. The device of claim 4, wherein the first antenna has a pair of antenna elements.

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8. The device of claim 7, wherein the antenna elements are substantially rectangular.

9. The device of claim 4, wherein the second antenna is a loop antenna.

10. The device of claim 4, wherein the chip is part of a strap that is operatively coupled to the antennas.

11. The device of claim 1, wherein one of the antennas includes a piezoelectric material.

12. The device of claim 11, wherein the piezoelectric material is part of a mechanically resonant element that is mechanically coupled to the other of the antennas.

13. The device of claim 11, wherein the piezoelectric material is mechanically coupled to a magnetic material element.

14. The device of claim 1, wherein one of the antennas includes a magnetic material element that is mechanically coupled to the other of the antennas, such that exposure of the magnetic material element to a magnetic field affects the tuning of the other of the antennas.

15. A system for detecting radio-frequency identification (RFID) devices, the system comprising:

an RFID device reader for detecting the RFID devices within a designated area; and

a pair of jamming signal transmitters to prevent detection of RFID devices outside of the designated area.

16. The system of claim 15, wherein the jamming signal transmitters are on opposite sides of the RFID device reader.

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17. The system of claim 16, wherein the jamming signal transmitters are substantially along boundaries of the designated area.

18. The system of claim 15,
wherein the jamming signal transmitters include a pair of low-frequency field generators; and

wherein the generators generate low-frequency signals in opposite phase relative to one another.

19. The system of claim 18, wherein the low-frequency signals are magnetic field signals.

20. The system of claim 18, wherein the low-frequency signals include signals having a frequency from 0.1 to 50 MHz.

21. The system of claim 18, wherein the generators substantially prevent detecting of RFID devices not between the generators.

22. The system of claim 15, wherein the designated area is an area through which pass objects that have the RFID devices coupled to them.

23. The system of claim 22, wherein the designated area is an area that includes a conveyor.

24. The system of claim 15, further comprising an additional pair of jamming signal transmitters.

25. The system of claim 24, wherein the pairs of jamming signal transmitters are oriented differently relative to one another.

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26. The system of claim 25, wherein one of the pairs of jamming signal transmitters is oriented substantially perpendicular to the other pair of jamming signal transmitters.

27. The system of claim 25,
wherein the jamming signal transmitters of one of the pairs of jamming signal transmitters are located on opposite respective sides of the designated area; and
wherein the jamming signal transmitters of the other of the pairs of jamming signal transmitters are both located in a side-by-side relationship on another side of the designated area.

28. The system of claim 15, wherein the jamming signal transmitters emit optical energy.

29. The system of claim 15, wherein the jamming signal transmitters emit infrared energy.

30. The system of claim 15, wherein the jamming signal transmitters emit acoustic energy.

31. The system of claim 15, wherein the reader is operatively coupled to the jamming signal transmitters.

32. A method for selectively detecting radio-frequency identification (RFID) devices, the method comprising:
using jamming signal transmitters to inhibit operation of RFID devices outside of a designated area; and
detecting RFID devices within the designated area.

33. The method of claim 32, wherein the using the jamming signal transmitters includes generating low-frequency signals from a pair of low-frequency field generators on opposite sides of the designated area.

34. The method of claim 33, wherein the generating includes generating low-frequency signals from one of the generators that is opposite in phase to low-frequency signals of the other of the generators.

35. The method of claim 34, wherein the generating includes generating signals having a frequency from 0.1 to 50 MHz.

36. The method of claim 34, wherein the generating includes emitting non-informational signals from the field generators.

37. The method of claim 32, wherein the detecting includes using an RFID device reader to detect the RFID devices.

38. The method of claim 37, wherein the reader is at least partially within the designated area.

39. The method of claim 37, wherein the jamming signal transmitters are on opposite sides of the reader.

40. The method of claim 32, wherein the using the jamming signal transmitters includes using jamming signal transmitters on opposite respective sides of the designated area.

41. The method of claim 40, wherein the using the jamming signal transmitters includes using an additional pair of jamming signal transmitters, wherein the additional devices are in a side-by-side configuration on an additional side of the designated area.

42. The method of claim 32, wherein the using the jamming signal transmitters includes using jamming signal transmitters in a side-by-side configuration on a side of the designated area.

43. The method of claim 32, wherein the using the jamming signal transmitters includes having the jamming signal transmitters emit optical energy.

44. The method of claim 32, wherein the using the jamming signal transmitters includes having the jamming signal transmitters emit infrared energy.

45. The method of claim 32, wherein the using the jamming signal transmitters includes having the jamming signal transmitters emit acoustic energy.

46. The method of claim 45, wherein the using the jamming signal transmitters further includes exciting a piezoelectric material of the RFID device.

47. The method of claim 32, wherein the using the jamming signal transmitters includes using a magnetic jamming signal to move a magnetic material that is part of the RFID device.